Instruction begins in the first year with examination of the eye and a lecture on various aspects of ocular disease. During the second year, students will receive a refresher lecture and lab on direct ophthalmoscopy as well as a lecture on ophthalmic manifestations of systemic disease and primary ocular disease. During the third year, students are given the opportunity during the surgery clerkship to spend four weeks on the ophthalmology services. In addition, during the third year there are lectures given to students during the Internal Medicine rotations. In the fourth year, a four-week intensive clinical rotation is tailored to students interested in pursuing ophthalmology as a career. Also, research electives are available under the guidance of numerous ophthalmology faculty members for fourth-year students.

Website: [http://ophthalmology.wustl.edu](http://ophthalmology.wustl.edu)

### Degrees & Requirements

While the Department of Ophthalmology and Visual Sciences does not offer its own degree, some of the department's courses are open to students in the MD and MSTP (MD/PhD) programs. Further information about the MD and MSTP degrees can be found in the Degrees & Programs Offered [section](http://bulletin.wustl.edu/medicine/degrees) of this Bulletin.

### Research

#### M50 Ophth 900

**Usha P. Andley, PhD**  
1114-C McMillan  
Phone: 314-362-7167  
Molecular basis of cataract; the function of molecular chaperones in cataract; proteomics, imaging and biochemical studies on cell culture and mouse models for crystallin gene mutations linked with cataract; testing drugs to inhibit cataract.

**Rajendra S. Apte, MD, PhD**  
Email: apte@vision.wustl.edu  
Innate immunity and immune effector mechanisms in the retina, oxidative stress and cell death, models of developmental angiogenesis and neovascularization, inflammation and photoreceptor survival, macular degeneration.

**Steven Bassnett, PhD**  
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Phone: 314-362-1604  
Eye development, stochastic models of lens growth, stem cell biology, age-related cataract, UV-induced somatic mutation, ocular manifestations of Marfan syndrome, cell death suppression on the optic axis, cell biology of transparent tissues.

**Anjali Bhorade, MD**  
Phone: 314-362-5343  
Evaluating the effect of glaucoma on visual function in older adults in the home. Understanding the relationship between vision and driving in older adults with glaucoma.

**Shiming Chen, PhD**  
618 McMillan  
Phone: 314-747-4350  
The molecular mechanisms regulating photoreceptor gene expression and the implications in understanding photoreceptor development and disease. We are focusing on three transcription factors, CRX, NRL and NR2E3, linked to photoreceptor degenerative diseases. Molecular genetics and biochemical approaches are used to identify the regulatory pathways associated with each factor. Mouse models are used to understand why mutations in these factors cause disease and develop therapeutic strategies, including AAV-gene therapy.

**Steven M. Couch, MD**  
Email: couch@vision.wustl.edu  
Orbital inflammatory diseases, surgical techniques and novel treatments of periorbital/orbital disease.

**Susan M. Culican, MD, PhD**  
1104 McMillan  
Email: culican@wustl.edu  
Clinical: development of a low-cost, simple visual function task for screening for macular disorders in the primary care setting. Education: examination of the utility of assessment tools for evaluating resident clinical progression during residency training. Development of new metrics to gauge resident progress.

**Philip L. Custer, MD**  
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**Thomas A. Ferguson, PhD**  
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Molecular basis of immune tolerance and how apoptotic cells tolerize the immune response. The role of immune privilege in the pathogenesis of eye diseases such as age-related macular degeneration (AMD). The role of basal autophagy in the cells of the eye by using the cre-loxP system to delete essential autophagy genes from specific cell types in the eye.

**Mae Gordon, PhD**  
Phone: 314-362-3716  
Molecular basis of immune tolerance and how apoptotic cells tolerize the immune response. The role of immune privilege in the pathogenesis of eye diseases such as age-related macular degeneration (AMD). The role of basal autophagy in the cells of the eye by using the cre-loxP system to delete essential autophagy genes from specific cell types in the eye.
Ocular hypertension, glaucoma, keratoconus, adenoviral conjunctivitis, randomized clinical trial methodology, patient-reported outcome measures and measurement reliability.

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Age-related cataract, ophthalmic pathology.

Andrew Huang, MD, MPH  
106 McMillan  
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Ocular surface stem cell biology, molecular therapy for corneal dystrophies and corneal neovascularization, oxidative stress of corneal endothelium, clinical research on dry eye and ocular surface disease.

Humeyra Karacal, MD  
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Treatment of uveitis, prevention of cataracts with anti-oxidants, anti-oxidants in age-related macular degeneration, retinal imaging and analysis using data mining techniques, designing OR equipment to facilitate ophthalmic surgery.

Michael A. Kass, MD  
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Principal Investigator of the Ocular Hypertension Treatment Study (OHTS). Diagnosis, treatment and public health aspects of glaucoma.

Vladimir Kefalov, PhD  
625 McMillan  
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Photoreceptor Neurobiology and Retinal Degeneration. We are a sensory neurobiology lab interested in the function of mammalian rod and cone photoreceptors. In addition, we are interested in the mechanisms of neurodegeneration in the retina and are working on developing pharmacological and gene-therapy tools for preventing photoreceptor cell death.

Daniel Kerschensteiner, MD  
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To understand the principles that guide the assembly of neural circuits and to decipher the way they process information. We would like to understand the principles that guide the assembly of neural circuits in the retina and to decipher the way they process information and hope to identify features of the retinal circuit architecture that perform particular computations and characterize how they arise during development. We then probe underlying mechanisms of circuit assembly and function through genetically targeted manipulations of specific cells in the retina.

John T. Lind, MD, MS  
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Glaucoma education, resident education, pharmacologic and surgical treatment of glaucoma, ophthalmic microbiology.

Gregg T. Lueder, MD  
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Retinoblastoma, eye misalignment (strabismus), retinopathy of prematurity, abnormal tearing, nasolacrinal disorders, cataracts, glaucoma.

Peter Lukasiwicz, PhD  
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Phone: 314-362-4284  
Neurotransmitters, synapses, retinal function in health and disease, retinal information processing.

Todd P. Margolis, MD, PhD  
Email (margolist@vision.wustl.edu)  
1. Cellular and molecular mechanisms that regulate herpes simplex infection neurons.  
2. Inexpensive telemedicine for reducing blindness in underserved populations.

Josh Morgan, PhD  
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Synaptic connectivity of visual circuits. Our goal is to understand the structure, development and pathology of synaptic connectivity that gives rise to vision. Our core approach is to reconstruct neural circuits in the retina and visual thalamus using large-scale 3D electron microscopy.

John R. Pruett Jr., MD, PhD  
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We use fcMRI to study the development of large-scale functional brain networks in infants at risk for autism spectrum disorder. We are specifically interested in fcMRI correlates of visual joint attention. Collaborative projects involve fcMRI studies of visual-motor integration.

Kumar Rao, MD  
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Nathan Ravi, MD, PhD, MS, FAAO  
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Directed toward understanding the pathophysiology of presbyopia and developing medical or surgical treatments for this condition.

Alan Shiels, PhD  
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Molecular genetic mechanisms underlying cataract, glaucoma and associated eye disorders: (1) genome-wide linkage analysis and targeted (exome, amplicon) sequencing for discovery of causative or susceptibility genes. and (2) genotype-phenotype and functional expression studies of naturally occurring and gene-targeted mouse models to characterize pathogenic mechanisms.

Carla J. Siegfried, MD
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My research is focused on ocular oxygen metabolism and the development of open-angle glaucoma. We are studying how the oxygen gradient in the eye is altered in disease states as well as noninvasive methods of measuring corneal oxygen consumption.

Florentina Soto, PhD
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Studies in my laboratory aim to identify the molecular basis of dendrites and axons lamination and synapse formation during development and in the adult retina. In addition, we investigate how these molecules could be involved in the development of retinal pathologies including retinal degeneration.

Larry Tychsen, MD
2S89 Eye Clinic, St. Louis Children's Hospital
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Principal investigator on NIH-funded studies of visual brain maldevelopment and repair in infant primates, as well as clinical studies of visuomotor abnormalities in cerebral palsy and pediatric refractive surgery.

Gregory P. Van Stavern, MD
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Neuroimaging of the visual pathways, Idiopathic Intracranial Hypertension, evidence-based medicine and clinical decision making; using the visual system as a model to study neurologic disorders.

A further description of research labs can be found on the Vision Core Researchers webpage (http://vrcore.wustl.edu/residentstudentresearchopportunities/RSROHome).

Faculty

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Rajendra Apte, MD, PhD
Visit our website for more information about our faculty (http://ophthalmology.wustl.edu/Faculty) and their appointments.

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Mark A Rothstein, MD
Assistant Professor of Clinical Ophthalmology and Visual Sciences
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MD University of Utah 1991
BA Williams College 1986

Michael B Rumelt, MD
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MD Washington Univ in St. Louis 1966

Philip A Ruzycki
Instructor in Ophthalmology and Visual Sciences (primary appointment)
BS Davidson College 2008

S
Scott Geoffrey Sagett
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Jonathan C Schell, MD
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OD Illinois College of Optometry 1957
BS1 Washington Univ in St. Louis 2000
BS Illinois College of Optometry 1957

Christopher G Seep, OD
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BA University of Missouri 1971
OD University of MO St Louis 1984

David Brian Seibel, OD
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OD University of Missouri 1987

Gaurav Kirit Shah, MD
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MD University of Illinois 1993

James Banks Shepherd III, MD
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MD Columbia University 1997
BA Amherst College 1992

Priya Saigal Shetty, MD
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Arsham Sheybani, MD
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Arsham Sheybani, MD
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MD Washington Univ in St. Louis 2008
Steven M Shields, MD  
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BS Washington Univ in St. Louis 1981  
MD Washington Univ in St. Louis 1986  

Alan Shields, PHD  
Professor of Ophthalmology and Visual Sciences (primary appointment)  
Professor of Genetics  
BS School Not Listed 1979  
PHD University of London 1983  

Howard Newton Short, MD  
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)  
BA Washington Univ in St. Louis 1974  
MD Saint Louis University 1978  

Carla J Siegfried, MD  
Jacquelyn E and Allan E Kolker M.D. Distinguished Professor of Ophthalmology (primary appointment)  
MD University of MO Kansas City 1989  
BA University of MO Kansas City 1989  

Charles D Signorelli, OD  
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)  
BS School Not Listed 1957  
OD School Not Listed 1957  

Morton Edward Smith, MD  
Professor Emeritus of Ophthalmology and Visual Sciences (primary appointment)  
Associate Dean Emeritus for Post-Graduate Education  
Lecturer in Ophthalmology and Visual Sciences  
Lecturer in Pathology and Immunology  
BS University of Maryland 1956  
MD University of Maryland 1960  

Bradley Thomas Smith, MD  
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)  
MD University of AL Birmingham 2002  

Claud Randall Snowden, OD  
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)  
BS Illinois College of Optometry 1972  
OD Illinois College of Optometry 1974  

Craig H Sorce, OD  
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)  
OD University of Missouri 1992  
BA Southern Illinois University 1988  

Florentina Soto Lucas, PHD  
Associate Professor of Ophthalmology and Visual Sciences (primary appointment)  
PHD University of Alicante 1992  

Mark H Spurrier, MD  
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MD Washington Univ in St. Louis 1980  
BA Kansas State University 1976  

Joseph Steska, OD  
Instructor in Ophthalmology and Visual Science (primary appointment)  
OD Illinois College of Optometry 2009  

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Instructor in Ophthalmology and Visual Sciences (primary appointment)  
MD Washington Univ in St. Louis 2012  
BE Vanderbilt University 2008  
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BS School Not Listed 1953  
OD School Not Listed 1954  
MBA Southern Ill Univ Edwardsville 1988  

Brian Patrick Sumner, OD  
Adjunct Instructor in Ophthalmology and Visual Sciences (primary appointment)  
OD Illinois College of Optometry 1978  

Kenneth V Swanson  
Instructor in Clinical Ophthalmology and Visual Sciences (primary appointment)  

T  

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BS Mass Inst of Technology (MIT) 1981  
PHD State Univ of NY Stonybrook 1990  
MD State Univ of NY Stonybrook 1991  

Matthew A Thomas, MD  
Professor of Clinical Ophthalmology and Visual Sciences (primary appointment)  
BS Harvard University 1977  
MD Harvard University 1991  

Linda Mei-Lin Tsai, MD  
Professor of Ophthalmology and Visual Sciences (primary appointment)  
BA Northwestern University 1990  
MD Northwestern University 1995  

Robert Lawrence Tychsen, MD
Courses

Curriculum courses for Ophthalmology and Visual Sciences are listed below (p. 13).


First Year

Introduction to clinical ophthalmology begins in the first year with a lecture and practicum (peer exam) on taking an ocular history and performing an ocular exam. Emphasis is on ophthalmoscopy. Lectures and practicum session will be led by Dr. John Lind and Dr. Morton Smith.

Second Year

During the second year, students will receive a refresher lecture and lab on direct ophthalmoscopy as well as a lecture on ophthalmic manifestations of systemic disease and primary ocular diseases.

Third Year

Third-Year Clerkship Opportunities

In the third year, students are given the opportunity to spend four weeks of their surgery rotation on the ophthalmology service. The students work closely with the ophthalmology residents and review the differential diagnosis of the "red eye," how to interpret an ophthalmologic consult note, and how to handle ocular emergencies. During this rotation, there is again emphasis on the use of the ophthalmoscope. Additional clinical skills introduced to student rotators include the use of the slit lamp and indirect ophthalmoscopy. All third-year students must complete the "Case Studies in Ophthalmology for Medical Students" and...
attend the periodic “feedback/oral exam” session with Dr. John Lind and/or Dr. Morton Smith.

Third Year/Fourth Year

Ophthalmology Sub-Internship Rotation ("The Sub-Eye"). During the month of June prior to fourth year, students interested in pursuing a career in ophthalmology are encouraged to rotate on this intensive four-week rotation. Students will have personal indirect ophthalmoscopy lenses available for use on the rotation. Formal didactics and workshops will be used to teach students how to perform a detailed ophthalmic history and exam including mastery of advanced slit lamp techniques and indirect fundoscopy. There will be an intense schedule of both live and recorded lectures delivered by ophthalmology faculty members with post-lecture quizzes. Students will be expected to perform daily required reading. Retention and understanding of reading materials will be gauged by frequent quizzes. Students are strongly encouraged to present a case at the department's Grand Rounds. By the end of the rotation, students will be expected to function at the level of a first-year ophthalmology resident.

Curriculum Courses

M50 Ophth 801 Ophthalmology
This elective is for senior students who plan to apply for a residency in Ophthalmology. In accordance with any sub-internship, medical students will be expected to function at the level of a beginning first-year ophthalmology resident on this rotation. The students will rotate through the resident eye clinic and the subspecialty clinics of the full time faculty of the Washington University Medical School Department of Ophthalmology and Visual Sciences (e.g., neuro-ophthalmology service, cornea/external disease service, etc.). The first day of the rotation will consist of an orientation day in which students will receive extensive didactics and participate in workshops to learn the basics of a complete ophthalmic history and examination. Students may opt to check-out indirect ophthalmoscopy lenses that may be used for the month to facilitate the acquisition of fundoscopy skills. During the rotation, the student's responsibilities range from observation (including observing surgery) to working at a resident level and completing full eye examinations. Didactics will include weekly case presentation sessions to Dr. John Lind or Dr. Morton Smith, weekly attendance at grand rounds, and a mix of medical student-oriented and resident-oriented conferences. Also, there will be medical student-oriented workshops to learn the basics of the slit lamp and indirect ophthalmoscopy. On day one, students will receive a schedule of conferences that they are expected to attend during the month. By the end of the four-week rotation, the student is expected to be proficient in taking an ocular history and performing a complete eye exam including slit lamp biomicroscopy and indirect ophthalmoscopy. The final grade of the student is determined by the course director with input from the residents, fellows, and faculty members of the particular service(s) through which the student rotated.

M50 Ophth 900 Research Elective - Ophthalmology
Research opportunities may be available. If interested, please contact the Department of Ophthalmology.

M50 Ophth 816 Away Rotation in Ophthalmology
This four-week elective is for senior students from medical schools across the United States who are in good standing at their home institution and who are planning to apply for a residency in ophthalmology. The students will rotate through the resident eye clinic and the subspecialty clinics of the full time faculty of the Washington University Medical School Department of Ophthalmology and Visual Sciences (e.g., neuro-ophthalmology service, cornea/external disease service, etc.). In exchange for a refundable deposit, students may opt to check-out indirect ophthalmoscopy lenses that may be used for the month to facilitate the acquisition of fundoscopy skills. During the rotation the student's responsibilities range from observation (including observing surgery) to working at a resident level and completing full eye examinations. Didactics will include weekly case presentation sessions to Dr. John Lind or Dr. Morton Smith, weekly attendance at grand rounds, and a mix of medical student-oriented and resident-oriented conferences. Also, there will be medical student-oriented workshops to learn the basics of the slit lamp and indirect ophthalmoscopy. On day one, students will receive a schedule of conferences that they are expected to attend during the month. By the end of the four-week rotation, the student is expected to be proficient in taking an ocular history and performing a complete eye exam including slit lamp biomicroscopy and indirect ophthalmoscopy. The final grade of the student is determined by the course director with input from the residents, fellows, and faculty members of the particular service(s) through which the student rotated.